

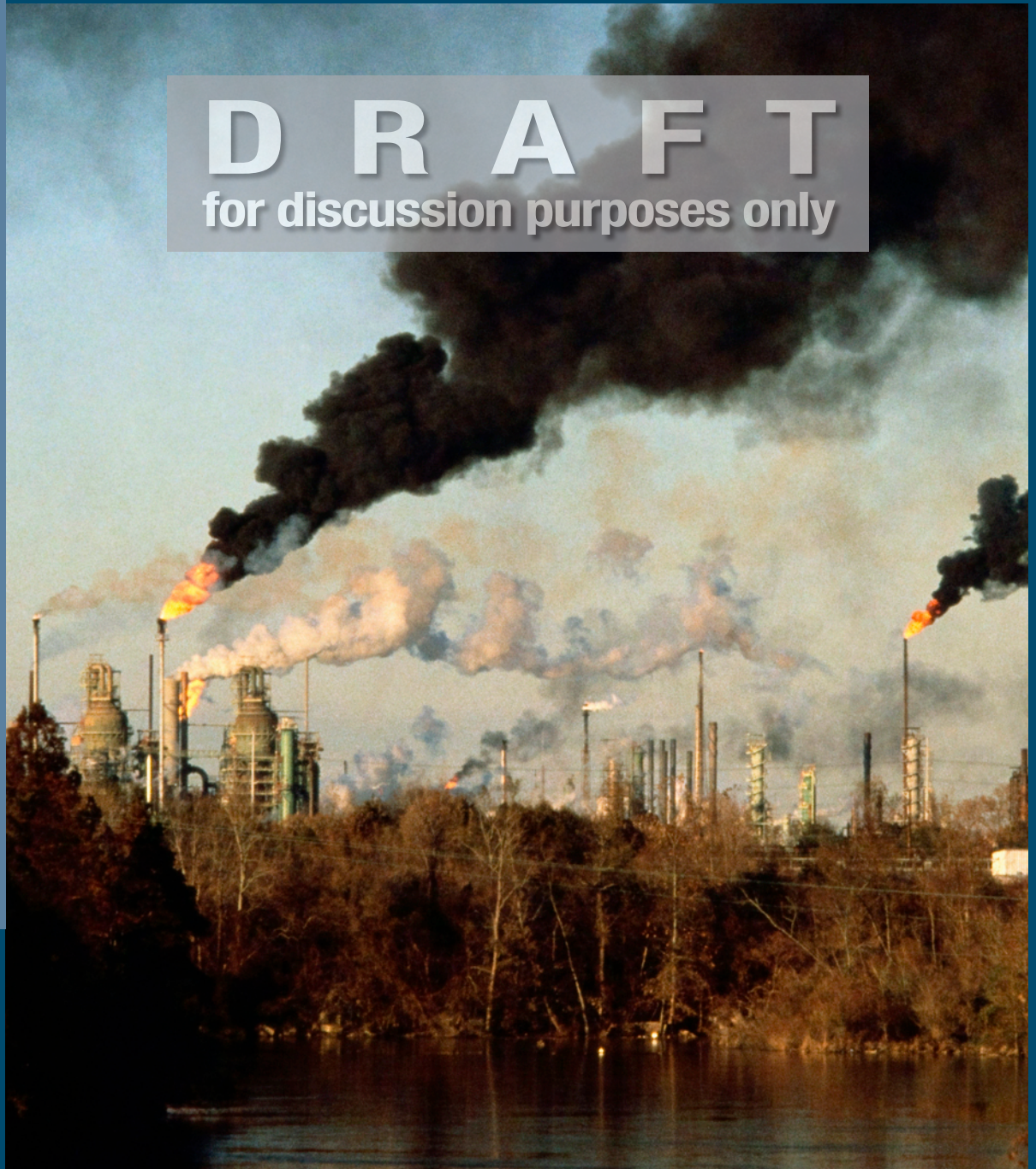
11

History-Social
Science Standard
11.8.6.



Supporting Materials
California Education and the Environment Initiative

D R A F T
for discussion purposes only



Postwar Industries and the Emerging Environmental Movement

DRAFT

for discussion purposes only

California Education and the Environment Initiative

ACKNOWLEDGEMENTS

The EEI Curriculum is a cooperative endeavor of the following entities:

**California Environmental Protection Agency
California Integrated Waste Management Board
State Education and Environment Roundtable
National Geographic Society
Heal the Bay
California Department of Education
California State Board of Education
Office of the Secretary of Education
California Natural Resources Agency**

Project Managers for the Education and the Environment Initiative:

Andrea Lewis, Assistant Secretary
Cal/EPA

Mindy Fox, Director
Office of Education and the Environment
California Integrated Waste Management Board

Funding for the development of this curriculum is provided through the generous support of the California Integrated Waste Management Board.

**Additional funding is provided by:
California Energy Commission, Department of Conservation, Department of Toxic Substances Control, and State Water Resources Control Board.**

CONTRIBUTORS

Author: **Jenny Pettit, M.A.**
California Connections Author: **Lily Dayton, M.E.**
Principal Consultant: **Dr. Gerald A. Lieberman**, Director, State Education and Environment Roundtable
Managing Editor: **Jennifer Rigby, M.S.**, Director, The Acorn Group

Office of Education and the Environment
1001 I Street • Sacramento, California 95812 • (916) 341-6769
<http://www.calepa.ca.gov/Education/EEI/>

© Copyright 2009

By the California Integrated Waste Management Board (CIWMB)

All rights reserved. This publication, or parts thereof, may not be used or reproduced without permission from the CIWMB.

These materials may be reproduced by teachers for educational purposes.



Contents

Assessments

Postwar Industries and the Emerging Environmental Movement— Traditional Unit Assessment Master	3
Human Imprint on the Great Central Valley— Alternative Unit Assessment Master	7

Lesson 1 Postwar Changes in the Great Central Valley

Activity Masters

Key Unit Vocabulary	11
<i>California Connections: A Postwar Boom in the Central Valley</i>	12
Changes in the Great Central Valley	16

Visual Aids

1 Environmental Consequences of Postwar Industry in the Central Valley	18
---	----

Lesson 2 Environmental Regions and Resources of North America

Activity Masters

Why Locate There?	19
-----------------------------	----

Visual Aids

2 Environmental Regions of North America	21
--	----

Lesson 3 Tracking the Postwar Industrial Boom

Activity Masters

Station Fact Cards	22
Postwar Industries at Work	25

Lesson 4 Effects of the Postwar Boom

Activity Masters

Community Case Studies	28
Truth and Consequences	31

Visual Aids

3 Environmental Consequences of Postwar Industry in the United States . .	34
---	----

Lesson 5 The Changing Times

Activity Masters

<i>Silent Spring</i> , Chapter 1	35
In Their Own Words	37

Visual Aids

4 DDT Talking Points	40
5 DDT Talking Points	41
6 Who is Rachel Carson?	42
7 Who is Rachel Carson?	43

Postwar Industries and the Emerging Environmental Movement

Traditional Unit Assessment Master | page 1 of 4

Name: _____

Part 1

On the map below, describe the environmental regions marked with a number. (5 points each)



1. _____
2. _____
3. _____
4. _____
5. _____

Postwar Industries and the Emerging Environmental Movement

Traditional Unit Assessment Master | page 2 of 4

Name: _____

Part 2

Use complete sentences to answer the following questions (5 points each).

6. What industry established itself in the grasslands and prairies of North America and why?

7. Describe the potential environmental problems associated with the activities of the energy industries after World War II.

8. Name two environmental regions where the energy industry grew after World War II and why.

9. Explain how postwar industrial agriculture affected the environment in the regions where it was practiced.

Name: _____

10. How did Rachel Carson's book, *Silent Spring*, change the way people thought about human activities and the natural environment?

11. Using the map in Part One, describe two other regions on the continent where postwar industries grew and the resources they relied on in those areas.

Essay

Answer the following prompt in a well-organized essay: (25 points)

Provide one example of how the practices (methods used to extract, harvest, transport, and consume resources) of a postwar industry have caused environmental problems in an area of the United States. Explain the environmental problems that were caused and then discuss how, as a result of these problems, humans assess the use and management of natural resources differently than in the past. Be sure to include an example from one of the environmental regions in North America.

Traditional Unit Assessment Master | page 4 of 4

[illegible]

Human Imprint on the Great Central Valley

Alternative Unit Assessment Master | page 1 of 4

Name: _____

Assignment

Write an editorial for the local paper. Explain, from an environmental perspective, how industries during the postwar period changed the Great Central Valley. Discuss the environmental problems that arose from these industries' practices and how those problems changed the way humans assess resource use and industrial practices.

Be sure to include the following information in your editorial:

- A description of the Great Central Valley and the environmental region it is a part of.
- A description of one of the industries in the Great Central Valley during and after World War II. Include the natural resources that attracted the industry to this location.
- Explain how the practices and methods of the industry caused environmental problems in the area.
- Discuss the political, social, environmental, and economic factors involved in decisions made about the industry.
- Discuss how the assessment of resource use in the Great Central Valley has changed over time because of the events during the postwar period.

You may use the information in ***California Connections: A Postwar Boom in the Central Valley***. You may also use the Internet to conduct additional research for your editorial (*Optional*).

The **Human Imprint on the Great Central Valley Scoring Tool** on the next page will be used to grade your editorial.

Your editorial is due on: _____

Human Imprint on the Great Central Valley

Alternative Unit Assessment Master | page 2 of 4

Name: _____

Human Imprint on the Great Central Valley Scoring Tool

	4	3	2	1
Description of the Great Central Valley and the environmental region it is a part of.	Writer effectively describes the environmental regions and the resources available to industry in the historical period.	Writer names the environmental region and some of the resources available to industry in the historical period, but does not provide details.	Writer describes the resources available to industry in the region, but does not describe or name the environmental region.	Writer describes the industry and/or names the environmental region, but provides no details about either.
Description of one industry in the Great Central Valley during and after World War II and natural resources that attracted the industry.	Writer describes the specific methods used, including accurate details and supportive evidence.	Writer describes the specific methods used, including some details and supportive evidence.	Writer describes the specific methods but lacks details and supportive evidence.	Methods are vague and not supported.
Explanation about how the practices and methods of the industry caused environmental problems in the area.	Writer describes the problems and explains in detail how they result from methods by using accurate and supportive evidence.	Writer describes the problems and explains how they result from methods by using accurate and supportive evidence.	Writer describes the problems but fails to make a connection to the methods.	Problems are vague and no connection is made.
Discussion of the political, social, environmental, and economic factors involved in decisions made about the industry.	Writer clearly explains the other factors that need to be considered in the industry by using specific examples.	Writer explains the other factors that need to be considered in the industry by using examples.	Writer explains the other factors that need to be considered in the industry but does not include examples.	No other factors are discussed or are too vague.
Discussion of how the assessment of resource use changed over time because of the events during the postwar period.	Writer clearly explains how the assessment process has changed in making decisions about using the resources of this area for human purposes.	Writer notes that the assessment process has changed in making decisions about using the resources of this area for human purposes, but gives few details.	Writer describes the assessment process used today in making decisions about using resources, but with few details and no mention of change.	Writer mentions that the assessment process has changed, but does not describe how.
Writing Style	Writing is well organized with no grammatical errors and is persuasive.	Writing is organized with a few grammatical errors and is persuasive.	Writing is not very organized with some grammatical errors.	Writing is disorganized with many grammatical errors.

Alternative Unit Assessment Master | page 3 of 4

[illegible]

Alternative Unit Assessment Master | page 4 of 4

[illegible]

Key Unit Vocabulary

Lesson 1 Activity Master

Acid rain: Precipitation with higher than normal acidity, generally a pH notably less than 7.0.

Advancements: Progress with, improvements to, or development of something, for example, increasing the speed of computers.

Degradation: The process by which the condition of a natural system is degraded due to human influences.

Ecosystem goods: Tangible materials such as timber and food produced by natural systems that are essential to human life, economies, and cultures.

Ecosystem service: The functions and processes that take place in natural systems, such as pollination, that support or produce goods and help sustain human life, economies, and cultures.

Environmental assessment: Determining the scale, size, and scope of the effects—positive and negative—that a proposed action may have on the natural environment.

Environmental Impact Report (EIR): A report, required by the California Environmental Quality Act (CEQA) of 1970, that requires “major” actions or projects to be assessed as to their potential effects on the environment prior to being implemented.

Environmental impact: The direct and indirect consequences of an action or event on the natural surroundings.

Environmental region: A geographical area that is defined by its distinct natural systems including ecosystems, landforms, climate, and soils.

Habitat fragmentation: The division of an ecosystem into smaller spatial areas due to human activities, such as agriculture.

Hypoxia: Oxygen depletion.

Radioactive: Atoms that spontaneously release energy.

Salinization: The accumulation of mineral salts in topsoil to levels that are above normal.

Surplus: An excess supply of goods or services.

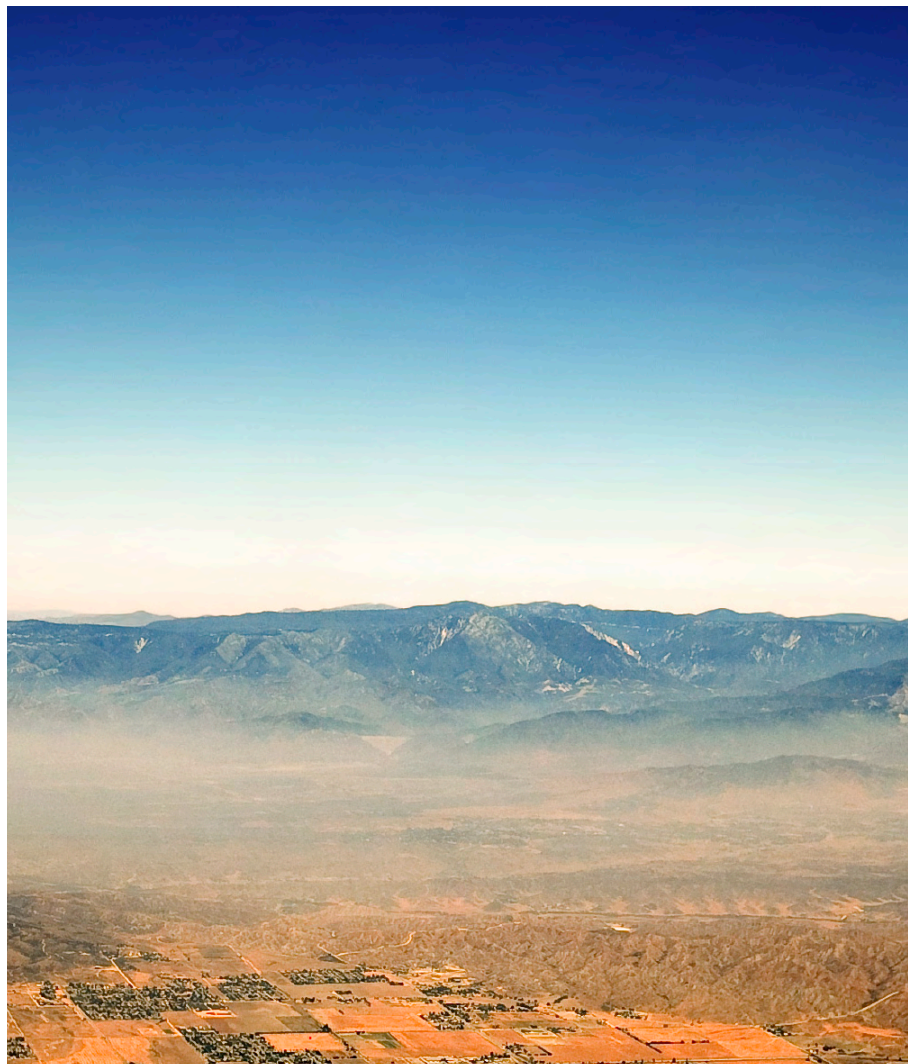
A Postwar Boom in the Central Valley



Driving north on Interstate 5 from Los Angeles, you drop down from the Tehachapi Mountains into the Tulare Basin. Here, the earth has been carved into geometric patterns of straight lines and sharp angles. Wide, rectangular areas are filled with row after row of verdant crops that spring from the arid land as if by magic.

Dairy farms and feedlots spike the air with pungency. The surrounding land is dotted with oil fields where derricks continuously move like giant, prehistoric creatures nodding their heads at the earth. Among the evidence of the agriculture and oil industries are a variety of strip malls and gas stations; parts of the once small towns have now been turned into cities strung along the interstate.

Few people realize that this southern portion of the Great Central Valley was formerly an enormous wetland (pre-1900). Before water was sucked out of the Tulare Basin and used for agriculture, several large lakes covered this region. One of them, Tulare Lake, was the largest freshwater body west of the Mississippi. During flood years, it could span 486,400 acres and reach depths of 50 feet. Streams that flowed from the Sierra Nevada fed these lakes.



Poor air quality in the Central Valley

California Connections: A Postwar Boom in the Central Valley

Lesson 1 Activity Master | page 2 of 4

Wetlands, oak woodlands, and vast grasslands surrounded them. This unique environmental region supported a wealth of wildlife, including herds of antelope and elk. Fish, otters, and waterfowl filled the lakes. Pelicans nested on an island in the middle of Tulare Lake, and the sky flickered with millions of birds that stopped here during their annual migration along the Pacific Flyway. Today, the sky is relatively devoid of birds. The great lakes are gone. In their place lies a stretch of terrain that hails as one of the driest in the state.

California Indians and European settlers knew of the resources of the Basin and used them creatively. Intensive human use of the Tulare Basin began in the 1800s, when farmers began cultivating the rich valley soils in earnest. After World War II, this region became the agricultural center of North America, and sections of the region transformed from rural to urban almost overnight. Over a decade, the war effort and the New Deal projects caused unprecedented population growth in California. Urban areas like Los Angeles expanded, pushing farmland into the open space of the Central Valley. More people translated to more food. In order to increase the yield to feed the high demand, farmers applied



Land damaged by excess irrigation

chemicals developed during the war on their crops. These petroleum-based pesticides and fertilizers proved very effective, but the long-term cost of their application had yet to be revealed. By 1948, California was the largest agricultural state in the nation.

The growth of agriculture, the aerospace industry, and population led to an increase in oil exploration in the state. California's Black-Gold Rush happened in 1921, the discovery of oil, just south of Los Angeles in Signal Hills. Demand for energy and petroleum-based products was so high that all the

oil derricks in the basin could not pump enough oil to serve California's needs. During this time, California became one of the world's top oil exporters. One of the nation's largest oil reserves, the Kern River Oil Field, sat under the southern end of the Great Central Valley. The oil industry had tapped this reserve during through WW I, but as the oil became harder to extract, the industry looked elsewhere. When the Korean War began in 1950, drilling in the Kern River Oil Fields resumed, and remains productive today.

In the 1950s and 60s, technology caused another

boom for the oil and agriculture industries in the Great Central Valley. Steam injection techniques allowed for easier extraction of crude oil from under the ground while equipment and workers remained on the surface. The valley's rich topsoil came under the control of a new form of agriculture known as agribusiness. Agribusiness is characterized by enormous fields of the same crop that are owned by corporations, irrigated by imported water, boosted by petrochemicals, and worked by a combination of oil-powered machinery and migrant labor. As agribusiness and the oil industries began to grow, towns

in the Tulare Basin grew as well. The rate of habitat loss increased as more natural area gave way to new communities, highways, railways, and roads.

But, it was not until the 1980s that state and federal agencies began to take note of the environmental changes taking place in the Central Valley. Toxic emissions from motor vehicles, industrial sources, and the agricultural industry filled the air, and an activity that people took for granted—breathing—became compromised. The Tulare Basin's air quality is affected by sources not only in the Basin but from outside areas as well. The Central Valley acts as an

“air magnet,” pulling in currents from the coastal and mountain areas across the state. Once in the valley, the mountains trap pollutants. From there they descend upon valley residents. Over the years since World War II, levels of carbon monoxide, ozone, and particulate matter in the air over the Tulare Basin have risen. In the 1980s, the air was recognized as a public health threat. The California Air Resources Board currently monitors sites throughout the Tulare Basin to assess air quality. They warn the public to limit outdoor activity when air pollution reaches dangerous levels. In recent years, more



Large-scale tomato packing facility



Oil pumps

strick state regulations on emissions have improved air quality. Still, the air over the Tulare Basin and most of the San Joaquin Valley does not meet state or federal health standards for ozone or fine particulate matter. Because of this, the San Joaquin Air Pollution Control District regulates industries such as agriculture and construction.

Another public health threat in the Tulare Basin, also recognized in the 1980s, is the degradation of groundwater and other fresh water sources. Industry runoff bearing pesticides and

nitrites from fertilizers, as well as crude oil and other contaminants from the oil extraction process, entered the valley's water supplies over the postwar decades. Many of these chemicals are toxic to humans, as well as wildlife, and cause illness, birth defects, and cancer. In 1990, a Tulare County assessment showed that one-third of aquifers tested had high levels of nitrites, with 20% above maximum levels. Once contaminated, groundwater supplies are extremely difficult to remedy. Government agencies in

the Great Central Valley monitor the byproducts of the agricultural and oil industries to prevent increased degradation.

In the past two decades, urbanization has increased 31% in the Tulare Basin. Only 7% of the San Joaquin Valley is undeveloped land—the lowest percentage of anywhere in California. This is the only land left to support the entire populations of the Basin's native species, many of which are listed as threatened or endangered. The California Department of Fish and Game monitors populations of these animals and develops conservation plans for their habitats. State and County agencies, in partnership with landowners and conservation groups, work to protect the few remaining natural areas of the Great Central Valley.

A look at the history of development in the Tulare Basin reminds us interconnected human communities are with natural systems. An environment with clean air, clean water, and areas of preserved open space sustains natural systems, and the health and well-being of the people who live there. Our experience in the Great Central Valley has taught us an important lesson—if we take steps to protect the health of our natural regions, we take steps to secure our future.

Changes in the Great Central Valley

Lesson 1 Activity Master | page 1 of 2

Name: _____

Directions: After reading the *California Connections: A Postwar Boom in the Central Valley*, answer the following questions. (5 points each)

1. Describe the environment of the Great Central Valley before World War II.

2. Describe the environment of the Great Central Valley during the 30 years after World War II.

3. What industries boomed during and after World War II in the Great Central Valley?

4. How did postwar industries affect the landscape of the Great Central Valley?

Changes in the Great Central Valley

Lesson 1 Activity Master | page 2 of 2

Name: _____

5. How did the postwar industries affect the water of the Great Central Valley?

6. How did the air change in the Great Central Valley, and how did that affect the environment in the region?

7. What is happening in the Great Central Valley today to help fix the environmental problems in the Great Central Valley?

Environmental Consequences of Postwar Industry in the Central Valley

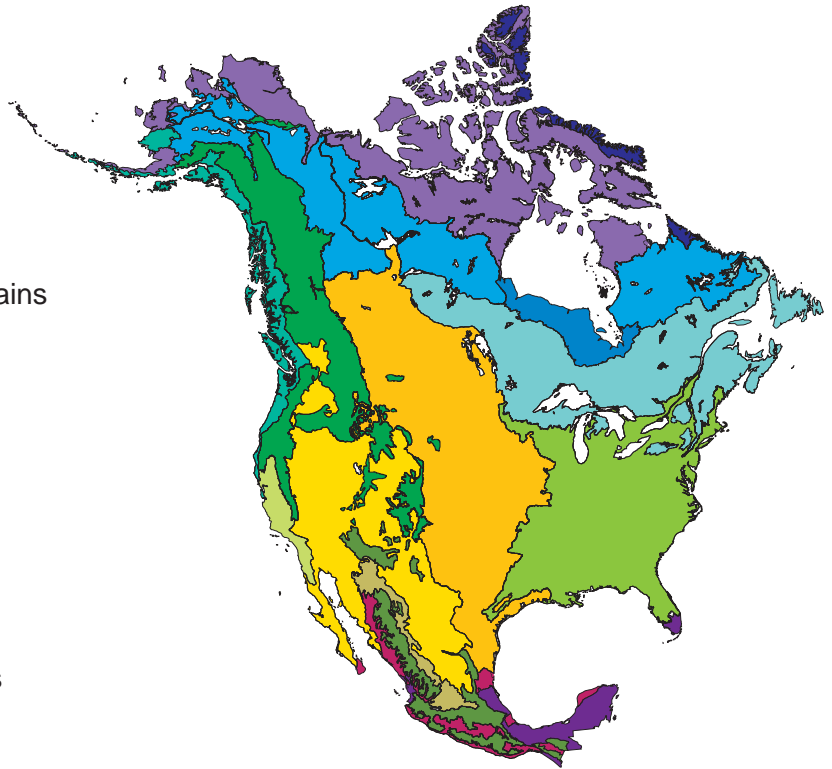
Environmental Problems	Possible Causes of these Problems

Why Locate There?

Name: _____

Next to the name of each North American environmental region, write “A” if it is an area in which agriculture is active, “E” if it is an area in which the energy industry is active, and “A and E” if both are active. Put an “X” in the space blank if neither industry exists in the region. (2 points each)

- _____ Arctic Cordillera
- _____ Tundra
- _____ Taiga
- _____ Hudson Plains
- _____ Northern Forests
- _____ Northwestern Forested Mountains
- _____ Marine West Coast Forests
- _____ Eastern Temperate Forests
- _____ Great Plains
- _____ North American Deserts
- _____ Mediterranean California
- _____ Southern Semi-Arid Highlands
- _____ Temperate Sierras
- _____ Tropical Dry Forests
- _____ Tropical Humid Forests



Answer the following questions during the environmental regions of North America discussion. (5 points each)

1. In which environmental region(s) is the agriculture industry active in North America?

2. In which environmental region(s) is the energy industry active in North America?

Why Locate There?

Lesson 2 Activity Master | page 2 of 2

Name: _____

3. Are there any natural regions that do not have agriculture or energy industry activities occurring within them? If so, which region(s)?

4. Why is agriculture found primarily in regions where there are grasslands and forests?

Environmental Regions of North America



Level I Regions

- 1 Arctic Cordillera
- 2 Tundra
- 3 Taiga
- 4 Hudson Plains
- 5 Northern Forests

- 6 Northwestern Forested Mountains
- 7 Marine West Coast Forests
- 8 Eastern Temperate Forests
- 9 Great Plains
- 10 North American Deserts

- 11 Mediterranean California
- 12 Southern Semi-Arid Highlands
- 13 Temperate Sierras
- 14 Tropical Dry Forests
- 15 Tropical Humid Forests



Station 1: Farming of Food and Non-food Crops

Agriculture in the United States changed drastically after World War II. Farmers all over the United States began to use advanced machinery, new types of pesticides, and better irrigation techniques developed during the war. With new irrigation techniques, farmers could grow high water consumption crops and farm in arid locations. Farmers used new fertilizers and pesticides to grow more crops in less time. The size of the average farm also increased after the war. Farm size doubled from about 200 acres in the 1950s to 400 acres in the 1970s. As the farms became larger, the farmers needed more equipment. The United States government helped farmers pay for the higher cost of new technology by giving the farmers subsidies. It became profitable for corporations to buy up farmland and pay the farmers to work for them. This led to the growth of agribusiness.

Increasingly, larger scale and more technologically sophisticated agriculture became less compatible with suburban development. This incompatibility translated to increased distances over which agriculture products were shipped, vastly increasing the amount of energy it took to produce food in the second half of the 20th century.



Station 2: Cattle, Pig, and Poultry Ranching

Before the 1950s, most livestock grazed on land that ranchers owned or leased from the government. After World War II, a surplus of grain, soy, and other food crops became available for use on cattle, poultry, and pig farms. This reduced the need for vast grazing lands to feed livestock, thus giving rise to the industrial ranch and feedlot. More livestock was raised in, or transferred to, feedlots where they were confined and fed large quantities of food prior to slaughter. Advancements in refrigeration technology allowed for an increase in time between the slaughterhouse and the market. Before refrigeration, livestock had to be transported live to the market, which put certain limitations on the industry. With reliable refrigeration, the regions where livestock could be raised and processed expanded throughout the Great Plains and into deserts and forested areas.





Station 3: Coal Mining

Coal was mined and used as an energy source in North America and Europe for more than a hundred years before World War II. The first coal-fired power plant, the Thomas A. Edison Pearl Street Station in New York City, went on-line in the United States in 1883. Since then, the amount of coal used to produce electricity has continued to rise. By 1970, coal production in the United States grew to a record 55 million tons. This increase resulted primarily from the use of larger, more efficient and effective strip-mining technology.

Before 1948, most coal was mined underground. But several mining disasters caused the industry to find alternatives to traditional shaft mining, which put miners at risk of cave-ins and exposure to deadly gases underground. As explosives and machinery improved during World War I and World War II, much of this technology carried over to mining businesses. Explosive methods of strip mining gave way to mountain-top removal techniques, which exposed more ore in less time. Some of the biggest moving equipment in the world, such as the “Mountaineer” shovel and the “Big Muskie” dragline, descended from postwar coal mining technology.



Station 4: Oil and Natural Gas Extraction

Petroleum comes from the Middle English words meaning “rock” and “oil”. Crude oil has a long history in the United States. However, it was not until the 1920s that the demand for oil and natural gas incited exploration for these resources beyond the existing sources in the United States. With the invention of the automobile and gas-powered machinery becoming more affordable, the demand for gasoline from petroleum increased. And, in an effort to replace “dirty” coal as a source of light and heat, more people in the United States began to use natural gas. By the 1950s there was a constant national and international demand for both crude oil and natural gas to fuel vehicles and machinery of all kinds. To meet this demand, oil and gas companies began exploring for undiscovered deposits. Using sonar technology (sound waves) developed during the war, oil and natural gas companies could locate underground deposits and determine the best way to extract them. They also used improvements in metals, welding techniques, and pipe-making developed during World War I and II to drill faster and farther, and to move oil and gas over long distances. Today, the oil and gas pipeline network in North America, if placed in one long line, would stretch to the moon and back *twice*.





Station 5: Hydroelectric Power Generation

The first electrical current was generated using a waterwheel in the 1880s. However, it was a direct current (DC), which meant it could only be used within ten miles of its source. In the 1890s, the generation of alternating current (AC), which could travel longer distances, led to the widespread use of hydroelectric power. The first major hydroelectric power system came on-line in 1893 in California near San Bernardino. In 1896, Niagara Falls, in New York, was used to generate hydroelectric power for the eastern United States. Between 1928 and 1933, the federal government helped to build massive dams in many parts of the country to meet the growing demand for electricity, and to provide jobs for some of the millions of unemployed during the Great Depression. As the nation entered World War II, the factories that contributed to the war effort put extreme demand on the power companies. After the war, more hydroelectric dams and power plants were built to supply energy to growing urban areas.



Station 6: Nuclear Power

Uranium is an element mined from the earth. Physicists first observed its radioactive properties in the 1800s. Nuclear fission was publicly demonstrated using uranium in 1938. And, in 1939, Albert Einstein wrote a letter to President Roosevelt describing a potential uranium weapon. By 1940, American scientists used plutonium—an element made from uranium—to produce a new kind of bomb. The United States developed and used nuclear weapons in World War II, and, after the war, President Eisenhower founded the international Atoms for Peace Program to promote non-military uses of nuclear power. The demand for uranium increased, as did the demand for places to safely develop, test, and store the waste from nuclear power applications.

To generate electricity using nuclear power, water is heated by the energy given off during fission. To safely produce and harness nuclear energy, additional water is used for cooling. Because of the demand for water during the process, most nuclear testing facilities and power plants are located in areas with plenty of water. In 1955, Arco, Idaho became the first town in the United States powered by nuclear energy. By 1960, more than 100 nuclear power plants had been built in the United States. By 1980, nuclear energy generated more power in the United States than oil.



Lesson 3 Activity Master | page 1 of 3

Part 1

Agriculture

Farming of Food and Non-food Crops: _____

Cattle, Pig, and Poultry Ranching: _____

Postwar Industries at Work

Lesson 3 Activity Master | *page 2 of 3*

Name: _____

Energy

Coal Mining: _____

Oil and Natural Gas Extraction: _____

Hydroelectric Power Generation: _____

Postwar Industries at Work

Lesson 3 Activity Master | page 3 of 3

Name: _____

Nuclear Power: _____

Part 2

What were the main reasons for the advancement of these industries during and after World War II? (10 points)

Community Case Studies

Lesson 4 Activity Master | page 1 of 3



Community: Centralia, Pennsylvania

The coal industry in Pennsylvania grew slowly from the late 1700s through the Civil War and helped found the iron, steel, chemical, glass, and metal-fabricating industries in the Pittsburgh area. The railroad network in Pennsylvania was constructed to transport coal in and around the state.

The consequences of the coal-mining industry are apparent all around Pennsylvania. Toxic waste from mining operations, erosion from strip-mining, and acid rain formed by emissions from coal-fired power plants have contaminated more than 3,000 miles of streams and ground water in the state. Many of these streams can no longer support life of any kind. Coal mining has also made the underground water in 45 of Pennsylvania's 67 counties unfit for wash water, much less for drinking. The deep abandoned mines repeatedly fill with water creating sulfuric acid that works its way to the surface and flows into other parts of the watershed.

On top of all this, Pennsylvania has the largest number of underground coal fires, some of which have been burning for more than 50 years. Most of these fires started in abandoned mines accidentally or by natural causes and have released tons of carbon dioxide and toxic smoke and steam. They have destroyed thousands of acres of wildlife habitat, as well as towns like Centralia in eastern Pennsylvania. Once these fires start, they cannot be economically put out and are left to burn until they have burned up all of the coal with which they have come in contact.



Community: Lafitte, Louisiana

Lafitte, Louisiana is located near New Orleans at the mouth of the Mississippi River. Fishing has supported this community for the last 100 years. Louisiana's fishing industry is the second largest in the United States, just behind Alaska. However, that industry is dying out due to what is called the dead zone. Just off the coast, an area the size of New Jersey becomes void of all life during the summer months.

The dead zone was publicized in the 1970s, but it may have existed a century before that. This particular dead zone varies in size from year to year, but it has grown consistently over the last fifteen years due to excess nitrogen and phosphorus that washes into the Gulf from the Mississippi River. This causes huge algae blooms to grow, but, when they die, they fall to the ocean floor and decompose, which depletes the oxygen in that area. This causes a condition, called hypoxia, where there is not enough oxygen for living things to survive. They suffocate and die or relocate to other waters.

The Post-World War II emphasis on larger, more productive farms in the Midwest led to a tremendous increase in the use of fertilizers and pesticides. These chemicals enter the Mississippi River through run-off from the "Corn Belt" states, particularly Ohio, Illinois, Iowa, and Minnesota. Then they flow downriver and into the Gulf, affecting the water quality and organisms there almost immediately. Other pollutants, such as discharge from power plants, urban run-off, and sewage also complicate the health of the Delta ecosystem.





Community: Ogallala, Nebraska

Ogallala, and many other towns in Nebraska, Kansas, the Dakotas, and Texas, were often devastated by the drought cycles typical of the mid-west, including the Dust Bowl of the 1930s. In 1898, one of the largest aquifers in the world, stretching from parts of Nebraska to South Dakota, Colorado, Wyoming, Kansas, Texas, Oklahoma, and New Mexico, was discovered and named after the city of Ogallala. But the farmers in this part of the world could not tap into this water source until the postwar period.

Due to technological advances in pumping technologies and creating cheaper electricity to run the pumps after World War II, this region has been able to irrigate crops and maintain successful large-scale farms year round, even in times of drought. Most farmers use the new center-pivot systems to irrigate their crops. This type of irrigation is similar to a sprinkler system, and the fields in which they are used are round, rather than square. However, this center-pivot system is an inefficient way to irrigate, because it sprays water into the air; thus, farmers lose more water to the atmosphere than the crops absorb.

Ogallala, and the surrounding area, primarily supports farming and ranching; these industries are a huge part of the economy. Water is an essential component for both industries. As the water level quickly drops in the aquifer, living in this area may become dangerous beyond the risk of drought—once the aquifer is empty, it may collapse. At the current rate of extraction, which has increased since the postwar period, projections show that the Ogallala Aquifer will be dry within 25 years.

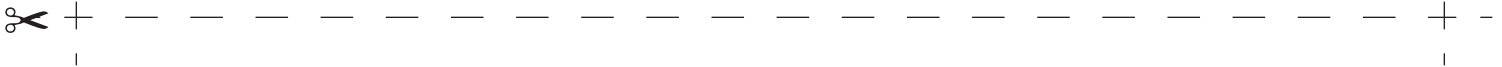


Community: Astoria, Oregon

The Columbia River flows 1,200 miles from the Canadian Rockies to Astoria, Oregon. This river contains the most dams, over 400 if you include all of the tributaries, than any other river in the world. It also contributes about 80% of the power consumed by residents and industry in the Pacific Northwest. Damming the river began in 1932 and continued until 1973. The dams created large reservoirs used for flood control, irrigation, and recreation. However, since the 1950s, the dams have changed the river system causing fish populations to decline significantly—specifically populations of salmon, which must migrate to the ocean and back in order to reproduce. Fish ladders, to help salmon swim upstream to spawn, have been installed at some of the dams, but there are no devices to help fish migrate to the upper half of the river. Young fish trying to swim downriver encounter many dams, increasing the amount of time it takes to make it to the ocean. A trip that would take a couple of weeks before hydroelectricity occupied this area, now takes several months. As a result, many fish do not manage to reproduce successfully before they die. In some cases, the government has transported the fish downstream via trucks and barges to help reduce the mortality rate.

Dams are not the only environmental problem on and along the Columbia River. During the postwar period, nine nuclear reactors were built along the banks of the river. These reactors use water from the river in the cooling stage of the nuclear power generation process, which it then returns to the river. Although the industry claims that water is cleaned prior to being returned to the river, traces of plutonium and other radioactive materials have been detected downstream from the power plants, even as far west as the Pacific Coast.





Truth and Consequences

Lesson 4 Activity Master | page 1 of 3

Name: _____

Answer the following questions about each community based on the case stories read in class. (2 points each)

The North Slope, Alaska

What postwar industries were established in this area? Why?

What were/are the environmental consequences of industrialization in this area?

Astoria, Oregon

What postwar industries were established in this area? Why?

What were/are the environmental consequences of industrialization in this area?

Truth and Consequences

Lesson 4 Activity Master | page 2 of 3

Name: _____

Lafitte, Louisiana

What postwar industries were established in this area? Why?

What were/are the environmental consequences of industrialization in this area?

Centralia, Pennsylvania

What postwar industries were established in this area? Why?

What were/are the environmental consequences of industrialization in this area?

Truth and Consequences

Lesson 4 Activity Master | *page 3 of 3*

Name: _____

Ogallala, Nebraska

What postwar industries were established in this area? Why?

What were/are the environmental consequences of industrialization in this area?

Environmental Consequences of Postwar Industry in the United States

Case (Community)	Environmental Problems	Causes of these Problems

Silent Spring

Chapter I—A Fable for Tomorrow

There was once a town in the heart of America where all life seemed to live in harmony with its surroundings. The town lay in the midst of a checkerboard of prosperous farms, with fields of grain and hillsides of orchards where, in spring, white clouds of bloom drifted above the green fields. In autumn, oak and maple and birch set up a blaze of color that flamed and flickered across the backdrop of pines. Then foxes barked in the hills and deer silently crossed the fields, half hidden in the mists of the fall mornings.

Along the roads, laurel, viburnum and alder, great ferns and wildflowers delighted the traveler's eye through much of the year. Even in winter the roadsides were places of beauty, where countless birds came to feed on the berries and on the seed heads of the dried weeds rising above the snow. The countryside was, in fact, famous for the abundance and variety of its bird life, and when the flood of migrants was pouring through in spring and fall people traveled from great distances to observe them. Others came to fish the streams, which flowed clear and cold out of the hills and contained shady pools where trout lay. So it had been from the days many years ago when the first settlers raised their homes, sank their wells, and built their barns.

Then a strange blight crept over the area and everything



Rolling hills

began to change. Some evil spell had settled on the community: mysterious maladies swept the

flocks of chickens; the cattle and sheep sickened and died. Everywhere was a shadow



Barren landscape

of death. The farmers spoke of much illness among their families. In the town the doctors had become more and more puzzled by new kinds of sickness appearing among their patients. There had been several sudden and unexplained deaths, not only among adults but even among children, who would be stricken suddenly while at play and die within a few hours.

There was a strange stillness. The birds, for example—where had they gone? Many people spoke of them, puzzled and disturbed. The feeding stations in the backyards were deserted. The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed

with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices there was now no sound; only silence lay over the fields and woods and marsh.

On the farms the hens brooded, but no chicks hatched. The farmers complained that they were unable to raise any pigs—the litters were small and the young survived only a few days. The apple trees were coming into bloom but no bees droned among the blossoms, so there was no pollination and there would be no fruit.

The roadsides, once so attractive, were now lined with browned and withered vegetation as though swept by fire. These, too, were silent, deserted by all living things.

Even the streams were now lifeless. Anglers no longer visited them, for all the fish had died.

In the gutters under the eaves and between the shingles of the roofs, a white granular powder still showed a few patches; some weeks before it had fallen like snow upon the roofs and the lawns, the fields and streams.

No witchcraft, no enemy action had silenced the rebirth of new life in this stricken world. The people had done it themselves.

This town does not actually exist, but it might easily have a thousand counterparts in America or elsewhere in the world. I know of no community that has experienced all the misfortunes I describe. Yet every one of these disasters has actually happened somewhere, and many real communities have already suffered a substantial number of them. A grim specter has crept upon us almost unnoticed, and this imagined tragedy may easily become a stark reality we all shall know.

What has already silenced the voice of spring in countless towns in America? This book is an attempt to explain.

Carson, Rachel. 1962. Silent Spring. Boston: Houghton Mifflin.

Name: _____

Part 1

The following are responses from world leaders to Rachel Carson's work. Read each quotation and answer the questions under each after discussing them with a classmate. (3 points each)

On August 29, 1962, a reporter asked President Kennedy if he was going to ask the Department of Agriculture and Public Health to take a closer look at the possible effects of DDT and other pesticides. The President responded, "Yes, and I know they already are. I think particularly, of course, since Miss Carson's book."

1. What effect do you think Rachel Carson's book had on the federal government's role in assessing human effects on the environment?

"The growers only have themselves to blame as they begin to reap the harvest from decades of environmental damage they have brought upon the land—the pesticides, the herbicides, the soil fumigants, the fertilizers, the salt deposits from thoughtless irrigation—the ravages from years of unrestrained poisoning of our soil and water. Thousands of acres of land in California have already been irrevocably damaged by this wanton abuse of nature. Thousands more will be lost unless growers understand that dumping more poisons on the soil won't solve their problems—on the short term or the long term. Health authorities in many San Joaquin Valley towns already warn young children and pregnant women not to drink the water because of nitrates from fertilizers which have contaminated the groundwater. The growers only have themselves to blame for an increasing demand by consumers for higher quality food—food that isn't tainted by toxics; food that doesn't result from plant mutations or chemicals which produce red, luscious-looking tomatoes—that taste like alfalfa."

— César Chávez, President of the United Farm Workers of America, November 9, 1984.

2. How do you think Rachel Carson's book changed the way members of the agriculture industry assessed the effects of their practices on the environment?

In Their Own Words

Name: _____

“As concern with the condition of our physical environment has intensified, it has become increasingly clear that we need to know more about the total environment—land, water, and air...Many agency missions, for example, are designed primarily along media lines—air, water, and land. Yet the sources of air, water, and land pollution are interrelated and often interchangeable. A single source may pollute the air with smoke and chemicals, the land with solid wastes, and a river or lake with chemical and other wastes. Control of the air pollution may produce more solid wastes, which then pollute the land or water. Control of the water-polluting effluent may convert it into solid wastes, which must be disposed of on land. Similarly, some pollutants—chemicals, radiation, pesticides—appear in all media.”

—President Nixon in a letter to Congress, July 9, 1970.

3. How do you think the environmental movement of the 1960s influenced the government’s thinking about the environment in general?

*“Rachel Carson’s influence reaches beyond the boundaries of her specific concerns in *Silent Spring*. She brought us back to a fundamental idea lost to an amazing degree in modern civilization: the interconnection of human beings and the natural environment. This book was a shaft of light that for the first time illuminated what is arguably the most important issue of our era.”*

*—Vice-president Al Gore in the introduction to the 1992 edition of *Silent Spring*.*

4. What do you think modern environmentalists see as the most important idea in Rachel Carson’s writings?

Lesson 5 Activity Master | page 3 of 3

Part 2

Describe how the ideas in Carson's book encouraged people to change the way they assessed political, economic, social, and environmental factors involving resources. Include examples from the quotations examined in this lesson. (10 points)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

DDT Talking Points

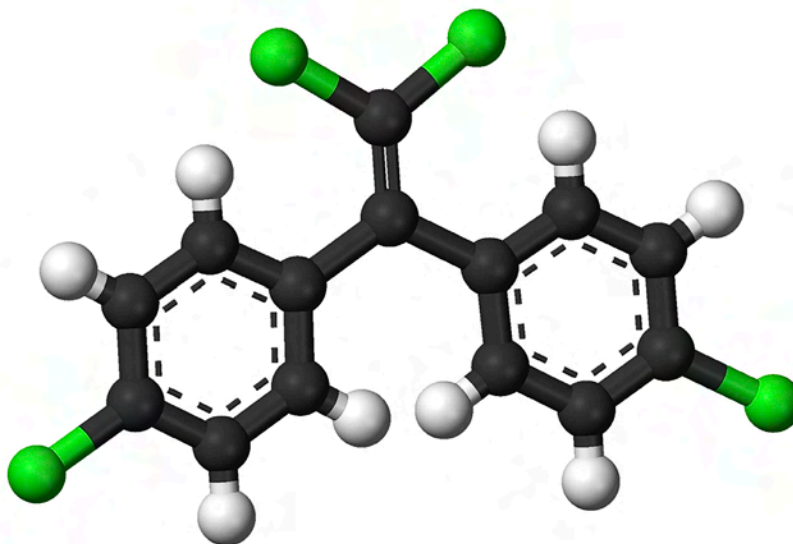
What is DDT?

- DDT stands for Dichloro-diphenyl-trichloroethane. It was developed in 1939 by Dr. Paul Müller who found that it quickly killed flies, aphids, mosquitoes, walking sticks and Colorado potato beetles. Its ability to kill so many species at one time made it the most effective pesticide known in the world at the time.
- The United States used DDT during World War II to kill typhus-carrying lice in Italy and malaria-carrying mosquitoes on South Pacific islands in order to protect the Allied troops fighting in those areas. They also used it regularly to dust soldiers traveling around the world to kill any lice they might be accidentally be carrying.
- After the war, civilians could buy the pesticide for household use. In 1945, farmers began using DDT on their fields to eliminate pests.
- In 1948, Dr. Müller won the Nobel Prize for his work in developing DDT.
- By 1967, malaria had been eliminated from populated areas of the world.
- DDT seeps easily into soil and mixes with water. During irrigation, runoff carries it to streams, rivers, and coastal waters.
- DDT works its way up through food chains. It concentrates in the fatty tissue of insect-eating fish and fish-eating animals, most notably birds.

DDT Talking Points

What is DDT? (continued):

- Some studies have shown DDT to cause cancer and reproductive problems in birds. Chemicals like DDT, mercury, and lead can weaken the eggshells of birds, resulting in parent birds crushing their egg clutches as they sit in their nests.
- The long-term effects of DDT on humans are not well understood, but concerns exist in the areas of cancer and developmental toxicity. It is considered moderately toxic by the World Health Organization.
- The United States banned the use of DDT in 1973, although other parts of the world still use it. The buildup of DDT in water can be reversed; the USEPA reported a 90% reduction of DDT in Lake Michigan fish by 1978 as a result of the ban.



Who is Rachel Carson?

- She was born in 1907 in Springdale, Pennsylvania, where she grew up.
- She graduated from the Pennsylvania College for Women (now Chatham College), where she earned a degree in Marine Biology. She earned a Masters degree in zoology from Johns Hopkins University in 1932.
- She worked for the United States Bureau of Fisheries writing radio scripts during the Depression.
- She became Editor-in-Chief of all publications for the United States Fish and Wildlife Service in 1936.
- She resigned from government work to become a full-time writer in 1952. She was quite successful writing naturalist articles and books.
- In 1962, her book, *Silent Spring*, was published. In it, she warns the public about the long term effects of overusing and misusing chemical pesticides.
- In 1963, she testified before Congress about the need for government policies to protect human health and the environment.
- Rachel Carson died in 1964 of breast cancer, at the age of 56.



Rachel Carson, 1940

Who is Rachel Carson?

What was the reaction to *Silent Spring*?

- People were alarmed, and the chemical industry fought back in the media, attacking Carson and her research.
- President John F. Kennedy ordered the President's Science Advisory Committee to research the findings in Carson's book.
- Suddenly people became aware of, and concerned about, some of the negative effects of human technology on the environment.
- The book encouraged people to reassess methods used in agriculture and consider more than just economic factors.
- The modern environmental movement was born.

Credits

Editing Credits

Instructional Editor	Jayne C. Henn, M.A.
Copy Editor	Holy Zynda
Photo Editor	Jovi Radtke, Uptown Studios

Design and Production Credits

Original Design	Karol A. Keane, Design & Communications, Inc./National Geographic Society
Graphic Production	Rebecca Voorhees, Creative Services, California State University, Sacramento
Printing	American Lithographers, Sacramento, California

Content and Educational Reviewers

Content	Robert J. Dunn, Ph.D.
California Connections	John Fraser, M.S., California State Parks

Illustration Credits

Page 41	DDT Talking Points – Ben Mills/Wikipedia
---------	--

Map Credits

Page 3	Environmental Regions of North America – Adapted from Commission for Environmental Cooperation, Ecological Regions of North America, Montreal: CEC. 1997
Page 19	Environmental Regions of North America – Adapted from Commission for Environmental Cooperation, Ecological Regions of North America, Montreal: CEC. 1997
Page 21	Environmental Regions of North America – Adapted from Commission for Environmental Cooperation, Ecological Regions of North America, Montreal: CEC. 1997

Photo Credits

Cover	Smoke from oil refinery – Sam Kittner/National Geographic Society
Page 1	Smoke from oil refinery – Sam Kittner/National Geographic Society
Page 12	Poor air quality in the Central Valley – Kris Hanke/iStockphoto
Page 13	Land damaged by excess irrigation – Annie Griffiths Belt/National Geographic Society
Page 14	Large-scale tomato packing facility – Willard Culver/National Geographic Society
Page 15	Oil pumps – Sarah Leen/National Geographic Society
Page 35	Rolling hills – Phil Schermeister/National Geographic Society
Page 36	Barren landscape – Emory Kristof/National Geographic Society
Page 42	Rachel Carson, 1940 – U.S. Fish and Wildlife Service/Wikipedia





California Education and the Environment Initiative

Reversed FSC logo to
go here

